H2020-MSCA-ITN
Bringing marine ecology into 21st century

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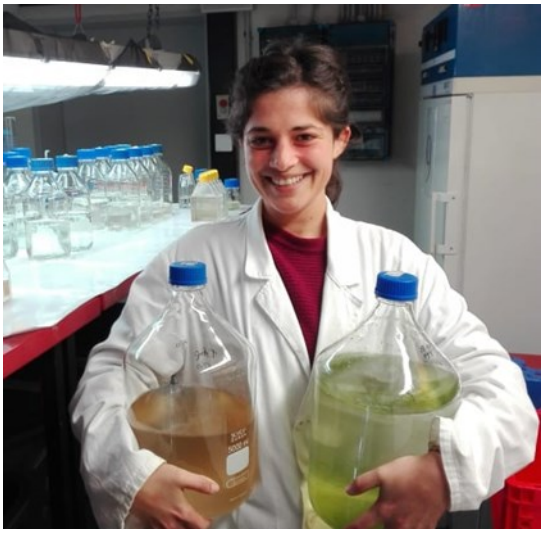
Training next generation marine ecologists in the mixoplankton paradigm

Autumn 2019 Newsletter: Project updates

In this Newsletter we feature the work of three of the 11 ESRs working in MixITiN.
See www.mixotroph.org for more information on the ESRs, and to read their blogs!

ESR6 Andreas Norlin

Most of the endosymbiotic Specialist Non-Constitutive Mixoplankton (eSNCM) groups cannot be kept in culture, so to acquire data on them it is necessary to go to sea. This limits the types of studies that can be conducted on them, and they have thus only been studied sparsely. I am exploring the gaps in our knowledge of eSNCM by constructing system dynamics models able to simulate the growth and interactions between host and symbionts. In collaboration with ESR4, Joost Mansour, I have conducted field experiments in the Mediterranean as part of my first year secondment. The last part of my secondment was a two-week cruise on an oceanographic research vessel *Thalassa*, surveying the North-Western Mediterranean. On this cruise, besides aiding in the general scientific effort, we regularly obtained water samples that allowed us to isolate Radiolaria and then conduct experiments.



ESR7 Maira Maselli

My autumn began in Bremerhaven (Germany), starting in September for 6 weeks of secondment at AWI to learn molecular methods to investigate interactions between Generalist Non-Constitutive Mixoplankton (GNCM) and their prey, in collaboration with ESR1 Kostas Anestis.

As generalists these mixoplankton can graze on many smaller protists. By enslaving chloroplasts from photosynthetic prey, they can then get energy from photosynthesis. However, different prey have different nutritional qualities, and different plastids perform differently within the GNCM. So which would be the best prey? **{continued overleaf}**

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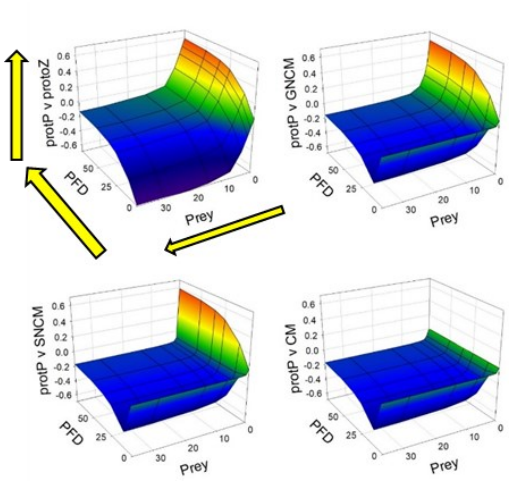
ESR7 continued .. To answer this question I am feeding my ciliate cultures with two different prey species, monitoring their growth and taking samples to analyze the elemental composition of both predator and prey.

Then, when these prey are grazed out, the ciliates have to rely only on photosynthesis to survive. Are there any internal switches that enables them to improve their photosynthetic abilities when necessary? Would one chloroplast type, from a different prey species, be better than another to support photosynthesis?

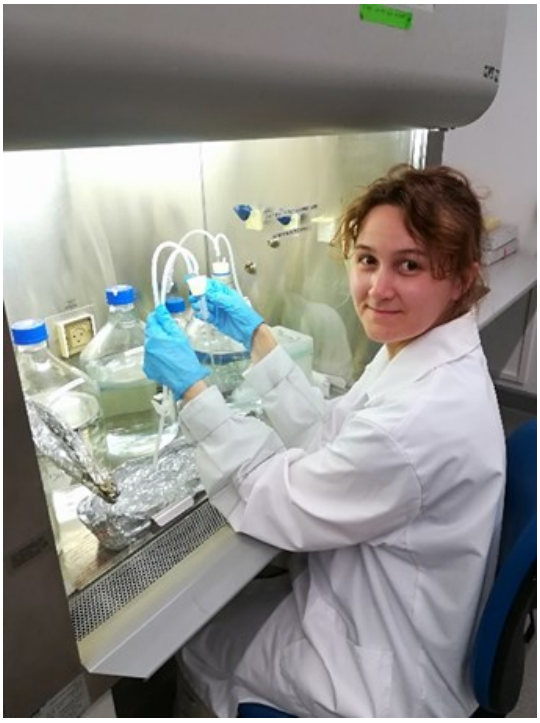
Transcriptomic analysis could provide insights on these matters, this is why I need to learn how to extract RNA and work with others to best interpret the resultant data in the context of my experiments.

Filters of prey cells (*Teleaulax* —red; *Nephroselmis* — green) awaiting analysis

ESR8 Anna-Adriana Anschütz



This summer, I stood with one foot in the real world and the other in the theoretical. I completed my model, so it can now simulate the growth of 5 different functional protist types including 3 types of mixoplankton in various environmental conditions. I presented my results at the *Mathematical Models in Ecology and Evolution* conference in Lyon (France) in July. And now my paper is in press in the journal *Marine Biology*!



Next, to get some real data to tune the model for a specific set of organisms, namely the *Teleaulax-Mesodinium-Dinophysis* complex, in which plastids are transferred successively from *Teleaulax* to the harmful algal species *Dinophysis*.

So I travelled to Helsingør (Denmark), to run growth experiments with the cryptophyte *Teleaulax* under different nutrient conditions. Two very work intensive months seemed to have been fruitful and now I am waiting for the final data to be analysed. Then, I can begin to make my model describe *Teleaulax* growth and then bit by bit get it to simulate the whole *Teleaulax -Mesodinium-Dinophysis* complex. Eventually, this model will hopefully help us understand better the triggers and dynamics behind the formation of harmful blooms caused by the mixoplankton *Dinophysis*.

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